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SCD COMPUTING NEWS

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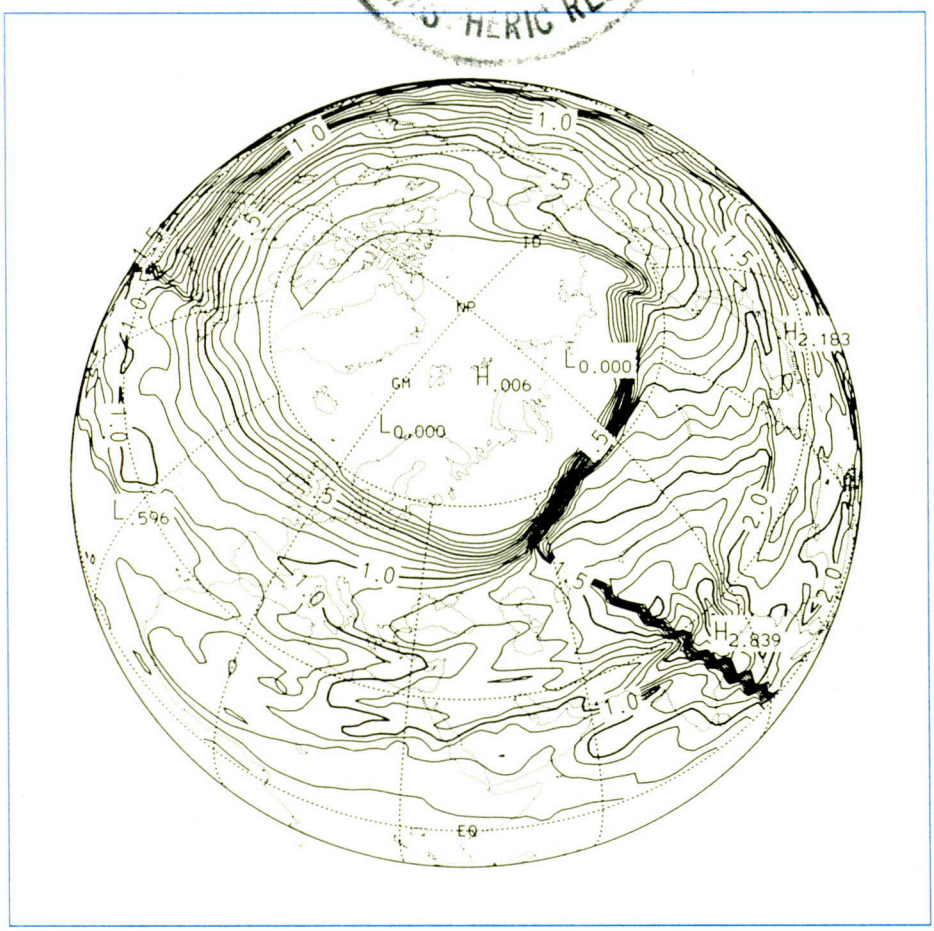

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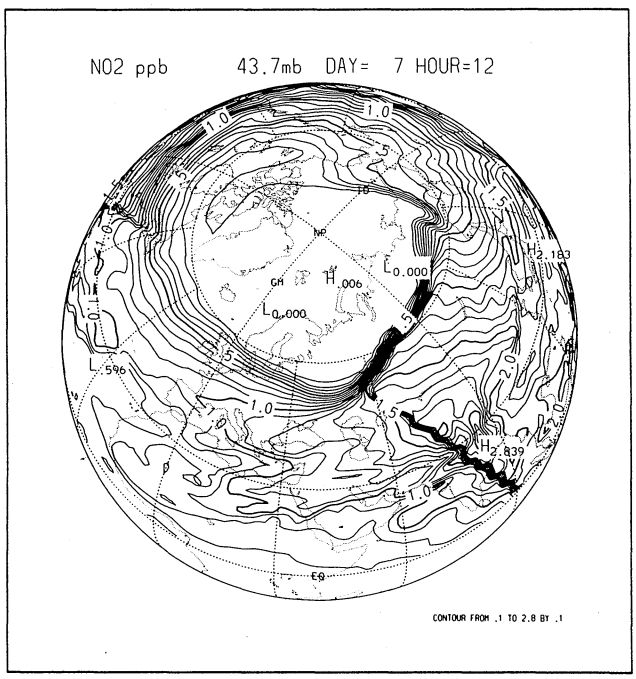
SCIENTIFIC COMPUTING DIVISION
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH



About the cover

The cover shows the nitrogen dioxide (NO_2) distribution at 43.7 millibars calculated for January 7, 1992. The distribution was calculated by the new offline chemistry-transport model developed by Franck Lefèvre, Guy Brasseur, Ian Folkins, Anne Smith, and Stacy Walters of NCAR's Atmospheric Chemistry Division.

This model is currently being used for a real-case study of the Arctic lower stratosphere during the 1991–1992 winter. The model includes a comprehensive photochemical package allowing a full description of the oxygen, nitrogen, chlorine, and bromine chemistry, as well as a rather detailed treatment of the heterogeneous processes on polar stratospheric clouds and aerosols. Analyzed winds and temperatures from the European Centre for Medium-Range Weather Forecasts and the National Meteorological Center are used respectively to drive the transport of 42 species of stratospheric interest and compute their loss and production frequencies.

The diurnal variation of NO_2 is clearly visible on this plot, with strong longitudinal gradients at the night terminator located in the 60W–90W (morning) and 60E–90E (evening) sectors. Lower amounts of NO_2 can be seen in daylight (photodissociation) as well as its slow decay during the night (conversion to NO_3). The abundance of NO_2 is effectively zero in the polar night region, due to the conversion to NO_3 and N_2O_5, and the suppression of nitrogen oxides in the presence of polar stratospheric clouds.

This plot was created with the Conpack, Ezmap, and Plotchar utilities of NCAR graphics.

SCD Computing News welcomes cover graphic submissions. Please send your graphic, along with a description including SCD facilities or software used, to Christine Guzy, Mesa Lab; or send e-mail to guzy@ncar.ucar.edu; or call Christine at (303) 497-1826.

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Δ

Software change articles: The delta symbol (Δ) appears next to the title of articles that may affect how you run your jobs.

Conventions: For a list of conventions used in this newsletter, see the Documentation department.

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PRINTED WITH SOY INK

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SCD Calendar

October

1–3	Conference on Parallel and Distributed Computing and Systems, Pittsburgh Supercomputing Center
7–8	SCD UNIX Basics Class
15–16	SCD Advisory Panel
26	SCD Users Group (SCDUG)

November

16–20	Supercomputing '92, Minneapolis
23	SCDUG

December

2–3	SCD UNIX Basics Class
8	SCD UNICOS Orientation Class
21	SCDUG

For more information about these calendar items, send e-mail to scdinfo@ncar.ucar.edu.

SCD DIRECTOR'S COLUMN

Supercomputer users welcome at SC '92

by Bill Buzbee

The IEEE/ACM supercomputing conference, which is cosponsored by the Institute of Electrical and Electronics Engineers and the Association for Computing Machinery, is widely viewed as the premier event in high-performance computing. This year's conference will be in Minneapolis, November 16–20. Supercomputer users are especially welcome at this event. Please see "Discoveries brought to you by Supercomputing '92" for further details.

MSS dataset information available via FTP

Those of you who use datasets provided by SCD's Data Support Section (DSS) are encouraged to read "Use FTP to obtain information on MSS datasets." Many DSS files are easily and quickly accessible via File Transfer Protocol (FTP) over the network, and this article gives information on how to take advantage of this option.

Analyze your code with FORTRAN-lint

This month's Hints from the Consultants department discusses a programming tool that can be of tremendous help in developing and debugging Fortran programs; see "FORTRAN-lint: Checking subroutine library calls."

Discoveries brought to you by Supercomputing '92

Supercomputing '92, the world's premiere conference on high-performance computing, will be held November 16–20, 1992 at the Minneapolis Convention Center in Minneapolis, Minnesota. Guided by the theme "Voyages of Discovery through Computing Technology," this year's conference offers a vast array of current information and numerous opportunities for making new contacts in this rapidly changing field.

This article offers a brief overview of the various Supercomputing '92 events. You can access continuously updated information about the conference via anonymous File Transfer Protocol (FTP) to the computer named ftp.ucar.edu on the Internet. Up-to-the-minute conference information appears in the **sc92** directory. Get the **README** file to see how the files in this directory are organized.

Instructions for using anonymous FTP appear in the Documentation department of this issue.

Speakers to share the latest information

Dr. Larry Smarr, director of the National Center for Supercomputing Applications, will deliver the keynote address. He will discuss the application of computational science to a set of fundamental problems in science and engineering known as grand challenges—problems with potentially broad economic, political, or scientific impact.

SCinet '92 will showcase the latest in supercomputing applications and remote systems.

The conference will offer 80 contributed papers and eight invited presentations. Contributed papers are being selected by a peer review process and cover major areas of high-performance computing. The invited presentations will be given by experts in their respective fields.

Supercomputing '92

Fifth annual high-performance computing conference. To be held November 16–20, 1992, at the Minneapolis Convention Center. For more information contact:

Supercomputing '92
Conference Office
SCD/NCAR
PO Box 3000
Boulder, CO 80307-3000
Phone: (303) 497-1808
Fax: (303) 497-1298

The program will include nine panels and six minisymposia. Panels will provide a forum for conference attendees to hear differing views on issues relating to high-performance computing; there will be opportunities to interact with the panelists. Minisymposia are sessions that present a concentration of talks focusing on a single theme. Birds-of-a-feather sessions (BOFs) will be held at various times throughout the conference and will be scheduled on a space-available basis. These informal sessions will allow conference attendees to exchange ideas and information on specific topics.

Expand your knowledge with tutorials and workshops

The 18 tutorials will provide broad coverage of popular and important topics that affect supercomputer professionals in a variety of disciplines and at a

Tutorials at Supercomputing '92

Monday's tutorials include:

Volume Visualization: Imaging Multidimensional Scientific Data

A Guided Tour of High-Performance Computing: Architecture, Software, Algorithms

Object-Oriented Programming Methods for Performance-Driven Computing

Fortran '90

Solving Linear Systems on Vector and Shared-Memory Computers

Introduction to Parallel Computing

Mathematica

Matlab: High-Performance Interactive Mathematical Software

Emerging Standards for High-Speed Local Area Networking

Archival Storage for Supercomputing Environments

Friday's tutorials include:

Interconnected Heterogeneous Multiprocessors

Computational Services in the UNIX Supercomputing Center

Stalking the TERAFLOP: Performance Tuning Tools for High-Performance Computers

Introduction to Computer Graphics and Scientific Visualization

Paradigms and Tools for Heterogeneous Network Computing

Memory Systems for Multiprocessors and Scalable Architectures

System Security in a UNIX Supercomputing Environment

Writing Programs for Distributed (Networked) Computers

Smart Parallelizing Compilers: Automatic Parallelization and Adaptive Run-Time Parallelism Management

variety of experience levels (see sidebar). Because tutorial attendance will be limited by available space or equipment, potential attendees are encouraged to preregister (registration information appears at the end of this article). The eight workshops will offer an informal and often interactive format for participants to explore common interests.

Highest-bandwidth network ever

SCinet '92, an innovative scientific network using high-speed communications between exhibitors and remote locations, will showcase the latest in supercomputing applications and remote systems.

SCinet '92 will provide a networking environment similar to those envisioned for the future. It will be the highest bandwidth network that can be experimentally assembled by leaders in the networking industry. Highlights will include:

- Demonstrations of the technical feasibility of building a networked supercomputing environment using High-Performance Parallel Interface (HIPPI), Fiber Distributed Data Interface (FDDI), Ethernet, local fiber, T3, and other technologies

- Facilities to allow researchers and exhibitors to show their work and products in operation

- A heterogeneous computing challenge, with awards to applications running on the network during the conference

Exhibits to show the newest (and oldest) computing technologies

Industry exhibits: Industry exhibits will present a comprehensive display of products specific to the supercomputing environment: hardware, software, peripherals, workstations, industry services, publications, networking, and communications. More than 25 exhibitors are expected to give 30-minute presentations on their latest developments during the Exhibitor's Forum. These industry presentations will not be "marketing hype"—they will be given by computer scientists, analysts, and engineers who will discuss recent breakthroughs in their areas of expertise.

History exhibit: The history exhibit, a first-time event at the supercomputing conference, will describe the beginnings of the computer industry. Highlighting the conference theme "Voyages of Discovery through Computing Technology," it will depict significant events in high-performance computing from the 1950s to the present. Displays will include actual hardware, modules, prototypes, and photos of historical computer systems.

Poster exhibits: Poster exhibits will provide an informal setting for researchers to display their work, allowing attendees to engage in direct, in-depth technical discussions with the researchers. Poster exhibits typically consist of graphics, charts, and text. Video posters will be included this year; these exhibits will use video graphics to illustrate the points of the presentation.

Research exhibits: Research exhibits will show a broad range of high-performance computing research projects. They will emphasize interactive and visual displays.

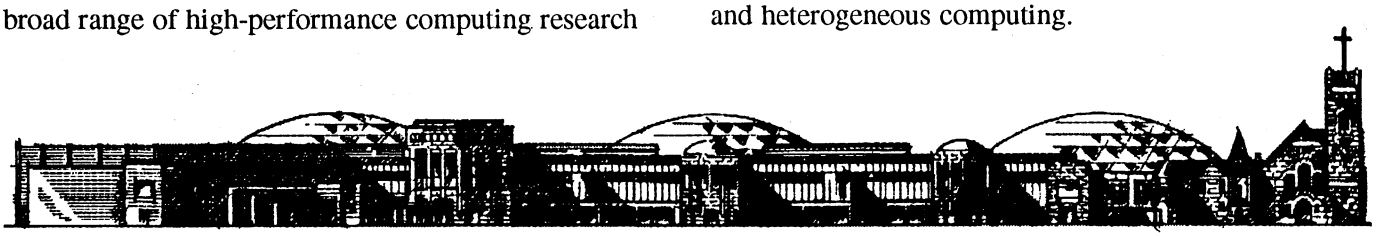
Visualization Theater: The Visualization Theater will present an entertaining mix of presentation-quality graphics and interactive visualization in computational science. This diverse collection of scientific visualization examples will play on Tuesday and Thursday evenings during the conference.

The history exhibit will describe the beginnings of the computer industry.

Virtual Reality Cave: The Virtual Reality Cave will offer a way for participants to transcend "reality" and take a journey never before offered at a supercomputing conference. Three-dimensional graphics and stirring visualizations promise to transport attendees to a place where the only limit is their imagination.

Center directors' roundtables to offer new ideas for management

The morning roundtable sessions will provide a forum for center directors to discuss timely topics dealing with strategic, management, or operational issues. The format of each session will allow two or three directors to present their point of view on the topic for the day, and the remaining time will include open discussion among all attendees. The sessions will be open to all, but will be of particular interest to people with management responsibilities at supercomputing centers. Topics will include massively parallel systems, mass storage strategies, workstation farms, and heterogeneous computing.



Supercomputing '92 will be held at the Minneapolis Convention Center, a state-of-the-art facility that was completed in December 1990. A unique Skyway System (a series of glass-enclosed, climate-controlled second-floor walkways) connects almost 70 blocks of downtown, including many of the hotels chosen to accommodate attendees.

Education program aims for next generation of computing professionals

This year's education program will focus on an introduction to high-performance computing for high school and middle school teachers. It will include hands-on activities and demonstrations, as well as presentations by representatives from current high school supercomputing programs. Some financial support is available. Secondary and minority educators are encouraged to apply.

For further information about the education program, please contact Ginger Caldwell, SC '92 Education Program Chair, National Center for Atmospheric Research, P.O. Box 3000, Boulder, CO, 80307; e-mail: sc92ed@ncar.ucar.edu; fax: (303) 497-1298; phone: (303) 497-1229.

Awards to recognize top achievers

The awards luncheon will feature a panel of speakers that includes John Rollwagen (Cray Research) and John Armstrong (IBM). They will discuss the High-Performance Computing and Communications Program. The following awards will be presented:

- The Forefronts of Large-scale Computation Award will be given to an individual or team making a significant contribution to computational science through the application of interdisciplinary techniques to solve an important scientific problem.

The Virtual Reality Cave will offer a way for participants to transcend "reality."

- The Gordon Bell Prize Lectures will consist of several talks given by the finalists for a monetary prize; the prize is awarded for the best speedup of a real parallel processing application running on a real machine.

- The Student Paper Award will be given for the best paper and delivery by a student.

Social events to offer entertainment and new contacts

The opening social event in the exhibit hall on Monday, November 16 will feature refreshments and live entertainment. It will provide an opportunity for attendees to meet exhibitors informally and view developments in high-performance computing technology at the industry exhibits. Receptions will also be held on Tuesday and Thursday evenings during the poster and video poster exhibits.

Registration info and other conference facilities—it's easy to attend!

To obtain printed registration forms, contact the Supercomputing '92 conference office (e-mail: sc92info@ncar.ucar.edu; phone: 303-497-1808) and ask for the advance information mailer. You may also use the online registration forms available via anonymous FTP to ftp.ucar.edu. Advance registration discounts are available; registration forms with payment in full must be postmarked by October 16, 1992. International attendees may submit their registration fee by wire transfer. Please study *all* the conditions for registering; the information mailer and the anonymous FTP files provide complete details about registration.

Workstations with Internet access for electronic mail will be provided at the convention center for conference attendees. Since these facilities are expected to be oversubscribed, we encourage you to bring your own workstation for use in your hotel room if you need extended connect time.

Twelve hotels will house conference attendees. Two of these are within walking distance of the Minneapolis Convention Center. Supercomputing '92 will provide shuttle services to and from the convention center for all conference activities. Hotel room reservations must be made in writing via the postal service mail or fax. Housing forms are available in the advance information mailer and via anonymous FTP to ftp.ucar.edu.

Atmospheric sciences conference well attended in Santa Fe

by Sara Van Dyke

The Computing and the Atmospheric Sciences 1992 conference (CAS '92) was held in Santa Fe, New Mexico, from June 28 through July 1. SCD Director Bill Buzbee chaired the program committee, as he did for the 1990 conference.

This year's meeting, attended by 63 participants, was very successful. The conference's purposes were to:

- Review the scientific capability of state-of-the-art climate models
- Discuss enhancements that will characterize the computational requirements of the next generation of climate models and estimate the computational requirements for these models
- Review advances in computing technologies and discuss the interaction between these technology advances and future model requirements

"CAS is the only forum that focuses on the intersection between computing technology and modeling within the atmospheric sciences," Bill said. "The conference enjoys international participation and received high marks this year from all attendees."

Keynote speaker for the conference was Steven Orszag from Princeton University's Program in Applied and Computational Mathematics. Steve discussed "Advanced Computational Fluid Dynamics Methods for the Future." Other speakers on the agenda gave the conference a decidedly international flavor (see Table 1 on page 8).

The next Computers and the Atmospheric Sciences conference will be held in Monterey, California, in the fall of 1993.

Sara Van Dyke is a writer/editor in the Documentation Group within the SCD User Services Section.

Table 1. Presentations given at CAS '92

Topic	Speaker	Affiliation
Climate System Modeling and Prediction	Lennart Bengtsson	Deutsches Klimarechenzentrum GmbH, Hamburg, Germany
Climate Modeling Work at the Hadley Centre Using a Unified Coupled Model	Timothy Johns	Hadley Centre for Climate Prediction and Research, United Kingdom
Climate Model Validation and Intercomparison	W. Lawrence Gates	Lawrence Livermore National Laboratory
Toward More Comprehensive Global Change Climate Models	Warren Washington	NCAR
NCAR Community Climate Model 2 (CCM2)—Eulerian and Semi-Lagrangian Versions	David Williamson	NCAR
The Implementation of the NCAR CCM2 on the Connection Machine 2	Dick Sato	NCAR
Livermore Model of Parallel Computing	Cecil E. Leith	Lawrence Livermore National Laboratory
An Overview of the Department of Energy's Computer Hardware, Advanced Mathematics, and Model Physics (CHAMMP) Program	Robert Malone	Los Alamos National Laboratory
Wisconsin Model Engine Project	John Anderson	University of Wisconsin at Madison
Real Applications on Parallel Systems	Roger Wiley	Meteorological Office, United Kingdom
MaSSIVE (Mass Storage System IV Enterprise)	Bernie O'Lear	NCAR
Visualization as a Tool for Analysis and Communication	Matthew Arrott	National Center for Supercomputing Applications, University of Illinois
Integrated Environmental Data Management	William Schramm	National Oceanic and Atmospheric Administration/ Center for Ocean Analysis and Prediction, Monterey
Present Status of Atmospheric Circulation Model at the Center for Climate System Research	Akimasa Sumi	University of Tokyo, Japan
Canadian Experience with Nippon Electric Company: Global Modeling and System User Interface	Michel Valin Iain Findleton	Dorval, Quebec, Canada

Finalists for Computerworld Smithsonian Award honored in Washington, D.C.

by Sara Van Dyke

Finalists for the Computerworld Smithsonian Award convened in Washington, D.C., on June 8 at a dinner held to honor the winners. NCAR representatives Bill Buzbee, Bernie O'Lear, and Dave Kitts, along with Cynthia Kruse, NCAR's Storage Technology Corporation (StorageTek) sales representative, attended the black-tie event held in the National Buildings Museum in downtown Washington.

Nominees for the Smithsonian Award, which is called "A Search for New Heroes," were judged on the following criteria:

- How the application benefits its users
- The importance of the information technology
- The application's originality
- The application's success in reaching its goals
- What obstacles were overcome in order to achieve success with the project

NCAR's Mass Storage System (MSS) was nominated in the Environment, Energy, and Agriculture category by StorageTek, a member company of the Chairman's Committee for the Computerworld Smithsonian Awards; NCAR was one of five finalists in the category. The Wilderness Society of Seattle, Washington—this year's Environment, Energy, and Agriculture category winner—was recognized for its Endangered Ecosystems Mapping Project. The project addresses issues surrounding fragile ecosystems, threats to endangered species, and the economic costs and benefits of conservation.

StorageTek's 4400 Automatic Cartridge System, referred to locally as the "silo," is key to the implementation of NCAR's MSS. This high-speed data-retrieval system allows scientists to access more than 400,000 files containing over 25 terabytes of data. The SCD-developed Local Data Network technology provides fast and cost-effective direct access to the huge datasets needed for processing of the large climate models.

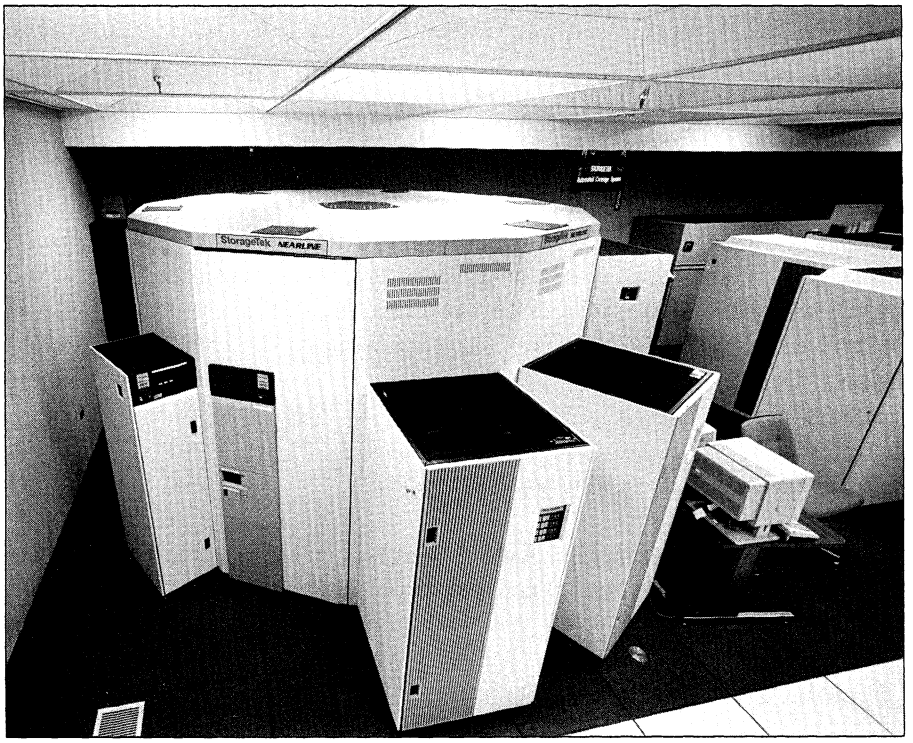
An NCAR-produced video, "Computing Technology and the Environment" was developed for the Computerworld Smithsonian Awards program. It shows how the MSS helps scientists analyze and respond to global climate change, most notably the greenhouse effect and ozone depletion. This video is available for showing and can be obtained from Susan Cross (e-mail: susan@ncar.ucar.edu; phone: 303-497-1133).

Dave Kitts, Cynthia Kruse, and Bernie O'Lear attended the Computerworld Smithsonian Award ceremony in Washington, D.C.

"Just being one of the five finalists was a tremendous honor," said Bill Buzbee, "and reflects the innovation that SCD staff members have incorporated into the MSS. We much appreciate encouragement from Storage Technology Corporation to participate in events such as this."

"I was rather taken back by the idea of attending a black-tie event," added Dave. "I found that it wasn't *too* bad, and I was impressed by the quality of projects being honored. It's a good feeling when the work the MSS group puts into a project receives national recognition."

Sara Van Dyke is a writer/editor in the Documentation Group within the SCD User Services Section.



The StorageTek 4400 Automatic Cartridge System, referred to locally as the "silo" because of its distinctive shape, is an important part of the MSS because it provides fast and cost-effective access to large amounts of data. (Photo by Bob Bumpas.)

Obtain monthly SCDUG report via anonymous FTP

Would you like to keep up with issues, discussions, and developments in NCAR computing? "News from SCDUG," the report on the monthly SCD Users' Group (SCDUG) meeting, is available on ftp. ucar.edu in the following directory:

docs/scdug/scdug.*mon*

where ***mon*** indicates the month (for example, **scdug.jun**).

See the Documentation department in this issue for instructions on obtaining documents via anonymous FTP.

Use FTP to obtain information on MSS datasets

by Ilana Stern

Over the past several months, SCD's Data Support Section (DSS) has moved many of its catalogs, documents, and software to the new DSS File Transfer Protocol (FTP) area. Although copies of these files are still maintained on the Mass Storage System (MSS), most users will probably find it easier to use anonymous FTP. The actual data files will continue to reside on the MSS, with the exception of a few small datasets that have been copied to the FTP area (which may be retrieved free of charge by any user).

The Internet name of the DSS FTP area is ncardata.ucar.edu (Internet address: 128.117.8.111). At your machine prompt, type:

ftp ncardata.ucar.edu

or

ftp 128.117.8.111

The screen displays:

```
Connected to huron.scd.ucar.edu.
220 huron FTP server (SunOS 4.1)
   ready.
Name (ncardata:yourname):
```

Type **anonymous** or **ftp** at this prompt. The screen displays:

```
331 Guest login ok, send ident
   as password.
Password:
```

Type your e-mail address as your password.

When you connect to the DSS FTP area, you start in the top level directory. There are several useful files in this directory, beginning with the **README** file, which briefly describes the various files and subdirectories. Other important files are **news**, which lists the most recent updates and new data, and **pricing**, which contains a summary of the DSS pricing policy and a list of the free datasets that are directly available via FTP. (Users with NCAR computing project numbers may use any DSS dataset free of charge.) The file **staff** lists the names, e-mail addresses, and locations of the DSS staff; each dataset has a specialist associated with it, so you can look up the contact information for him or her in this file.

How to get started

The place you will probably want to start is the **catalogs** directory. You can access this directory by typing:

cd catalogs

within FTP. This directory contains lists of datasets, organized in various ways. The file **dstitles** is a list of the DSS reference numbers and titles of all the datasets in the archive, similar to the MSS file **/DSS/D/CATDS**, which was described in the August 1991 issue of *SCD Computing News*. Other files in this directory list more information about particular subsets of data; for example, the file **ocean_ds_list** contains information about various oceanography datasets.

DSS has moved many of its catalogs, documents, and software to the new DSS FTP area.

Finding out what's available

Another useful file in the **catalogs** directory is **keyword**. This is a list of all the keywords used to identify each dataset, followed by a list of datasets and their keywords. After you get this file via FTP, first identify the keyword of interest, and then search for its occurrence in the second part of the file.

Example 1. Excerpt from keyword "SST" list

```
DS061.5 Z STREAMFN T TMIN SLP U V W RH SST
DS066.0 SLP SST Z T TMAX TMIN U V W RH PRECIP SNOW
DS082.0 SLP SFCP Z T SFCT SST U V RH PWAT \SST STARTS 16MAY79
DS082.1 Z T U V RH SLP SFCP SFCT SST SNOW THETA
DS107.0 SLP SST Z T U V ICE ELEV
```

For example, suppose you wanted sea-surface temperature data. The **keyword** file contains the line:

```
SST SEA SURFACE TEMPERATURE
```

indicating that "SST" is the keyword associated with sea-surface temperature data.

A search through the rest of the file for the keyword SST gives a long list of datasets that contain sea-surface temperature data. Example 1 shows an excerpt from this list.

The leftmost item on each line is a dataset reference number. You can get more information about any particular dataset in a variety of ways. Be aware that not all datasets have been entered into the keyword database, so there may be additional datasets that meet your needs but are not listed there.

Given the reference number of a dataset, you can obtain its complete title from the file **dstitles**. In your search, use a lower-case "ds" in the dataset reference number. For example, the entries for the first two datasets in this list are:

```
ds061.5 NMC B-3 47x51 N.Hem Anals,
   daily 1962Mar-1972

ds066.0 NMC 65x65 N.Hem Tropo Anals,
   daily 1973-con (& 47x51 by DSS)
```

The titles usually indicate the data source (in this case, it is NMC, the National Meteorological Center), the period of record, the frequency, and in the case of gridded data, the grid size. Browsing through this file may give you ideas about other datasets that might meet your needs.

Getting information on a particular dataset

For more information, you should access the **datasets** directory. This directory has a subdirectory for each dataset in the archive. All of these subdirectories contain basic information about the datasets; some contain documentation, data inventories, and/or programs to read and decode the data. Several even have small subsets of sample data.

For example, suppose you were interested in ds066.0. To return to the top level from the **catalogs** directory, you would type:

cd ..

Then, to get to the subdirectory with information on ds066.0, type:

cd datasets/ds066.0

There are several files in this subdirectory. The **MASTER** file is found in every dataset subdirectory; it is the dataset writeup described in a previous article ("How to get information on the SCD dataset archive," *SCD Computing News,* August 1991). As an example, the file **datasets/ds066.0/MASTER** in the ncardata.ucar.edu FTP area is identical to the file **/DSS/D/DS0660** on the MSS. The **MASTER** file contains a brief summary of the dataset contents, the name of the DSS specialist to contact for help with that dataset, and the locations on the MSS of the data files and read programs.

Conventions we're using

Since the DSS has just started transferring information to the FTP area, in many cases the **MASTER** file is the only one in the directory. Eventually most dataset subdirectories will contain useful programs and documentation. The files in these directories can be identified by their extensions. Fortran programs have an extension of **.f** (or **.for** for IBM PC–compatible Fortran programs), such as **read.f** or **subs.for**. Files that may contain Fortran code and are ready to be submitted to the CRAY Y-MP8/864 (shavano) have an extension of **.bat** (for "batch") or **.qsub**; **qsub** will eventually be the standard suffix for these files. Sample data files in binary format have an extension of **.pbin** (for "packed binary"). Plain ASCII files and directory names have no extensions. If the actual data file resides in the FTP area, it will be named **data** if it is an ASCII file, or **data.pbin** if it is in packed binary format.

Other common extensions that you might see include:

.c	C code
.csh	C shell script
.exe	Executable UNIX file
.cosb	COS-blocked file
.troff	Troff file
.tex	Tex file
.ps	PostScript file

Researchers can now identify datasets and use them on shavano with minimal assistance from DSS.

Two other useful directories

Some of the access programs require common utility subroutines for such functions as bit movement or grid interpolation. These routines, which are used by the access programs for many different datasets, are located in the **libraries** directory. Many of these routines are in the standard libraries on shavano, so you won't need them unless you are planning to use the data on another machine.

One more directory that may interest users is the **download** directory. If you would like to use a small dataset on another computer and you don't have access to the MSS, DSS staff can move it from the MSS to this directory for you to retrieve via FTP. There is a charge for this service. Please consult the specialist for that dataset to verify that the dataset is small enough to be transmitted electronically.

Call us for help

The DSS staff hopes that the NCAR user community finds the new DSS FTP area useful. In many cases, researchers will now be able to identify datasets for their use, and access them on shavano, with minimal assistance from the DSS staff. We do recommend, though, that first-time users of the archive contact DSS. For information on a particular dataset, contact the specialist (listed in the **MASTER** file for that dataset); for general archive information, send e-mail to datahelp@ncar.ucar.edu, or call DSS at (303) 497-1219.

Ilana Stern is a member of the SCD Data Support Section.

IRJE rebuilt to keep pace with increased use

by Nancy Dawson and Greg Woods

The recent overhaul of the Internet Remote Job Entry system (IRJE) was something like having a new engine put in your favorite, aging car that has already seen 150,000 miles of service. Although the IRJE software was completely rewritten, the outer shell that users see—the interface—remains virtually the same.

Over the past year, an increasing number of university users have been using IRJE to move jobs to and from the computing resources at NCAR. IRJE users submit jobs directly from their local host computers to the NCAR Cray computers and receive the output back on their local computers, without ever having to log on to an NCAR machine. They also use the system to access the Mass Storage System (MSS), the Text and Graphics System (TAGS), and the high-speed laser printers.

Like an old car with engine problems, the IRJE system was still functioning, but straining to keep up with the increased workload.

Like an old car with engine problems, the IRJE system was still functioning, but straining to keep up with the increased workload. The number of IRJE registered users increased by almost 200 during 1991, and the jobs submitted increased by 2,000 a month. By the end of 1991, 653 users and 8,383 jobs a month forced IRJE to run at full speed all the time. Before the software was rewritten, the IRJE computer (windom.ucar.edu) would run out of memory, disks would become full, and sometimes the system would crash from the heavy load. And the old system did not have any load controls, so every job that came in was processed immediately. If many jobs came in simultaneously, the resulting traffic jam would cause system failures.

The challenge for SCD staff was to upgrade IRJE to meet current and future demands, but maintain the interface that many users already knew and depended on to get their work done. SCD decided to use the NCAR-designed MASnet/Internet Gateway Server (MIGS) software to replace the IRJE software, while maintaining the familiar IRJE user interface. The MIGS software provided several advantages over the old IRJE software:

- MIGS can handle more jobs and still place a much lighter load on the system. It also has load control built in.
- MIGS has been thoroughly tested through years of use by NCAR users.
- MIGS was designed to provide for future capacity and changes, making it possible for the IRJE interface to "sit on top" of it.

Road-test results

Of course, any time a major software system is completely rewritten and still kept in service during the rewrite, there are going to be a few potholes, but for the most part, the new IRJE system has been a success. The load on the windom computer has dropped dramatically since early May, when the most active users were converted to the new system; the system no longer runs out of memory or crashes due to heavy load. The new disk scrubber keeps the disks from filling up, while still allowing space to retain job

and output files for a long enough time so SCD staff can troubleshoot any problems users report. And finally, the new system is easier for SCD to monitor and administer, freeing staff to pursue other development projects.

Latest model of IRJE sports two new features

1. IRJE users now have direct access to the online database that stores their registration information. This means no more moving your file with registration information (the former **.ntwkparms** file) back and forth over the Internet for temporary changes, or waiting for the system administrator to make a permanent change after you requested it by e-mail.

2. The new version of IRJE includes another change that users of TAGS will appreciate. As additional keywords and parameters are added to TAGS to accommodate the growing list of output devices, IRJE will now immediately accept those new values and pass them on to TAGS for processing. Under the old IRJE system, only a limited set of TAGS output devices were available to IRJE users, and there was a delay before each new TAGS device could be added to the IRJE software.

IRJE users received e-mail notices in May and June about these new features, and both are documented in the new version of "IRJE: Using the NCAR Internet Remote Job Entry System."

For hardcopy, see the back cover for ordering information; for the online version, use the anonymous File Transfer Protocol (FTP) account on ftp.ucar.edu. The pathname is **docs/networking/irje**. Instructions for using FTP appear in the Documentation department in this issue.

Signing up to use IRJE

If you would like to become an IRJE user, your local computer must have the standard TCP/IP (Transmission Control Protocol/Internet Protocol) applications of FTP and electronic mail, as well as Internet access. Your local system administrator can tell you if your local computer meets these requirements. If so, get a copy of the IRJE registration form from the anonymous FTP account on ftp.ucar.edu. The pathname is **irje/template**. Fill it out online and mail it back to irje@windom.ucar.edu. You will be notified by e-mail when your account has been set up. (If you want to see a filled-in example of the template, also get the file **irje/template.ex**.)

The IRJE user interface is virtually the same.

Nancy Dawson is a writer/editor in the Documentation Group within the SCD User Services Section. Greg Woods is the chief IRJE mechanic and a programmer in the Distributed Services Group within the SCD Distributed Services and Scientific Visualization Section.

Fortran 90, CF77 5.0 make use of vector intrinsic functions

by Jeanne Adams

Editor's note: This is the eighth in a series of articles about Fortran 90 features available on version 5.0 of CF77, the Cray compiling system. Future articles will discuss new input/output facilities and pointers in Fortran 90 and CF77. See also "The WHERE construct in Fortran 90 and CF77," in this issue.

The term *intrinsic* in Fortran 90 is used to describe facilities that are always defined by the language and available to programmers—that is, procedures such as sine and cosine, data types such as REAL or INTEGER, and operators such as +, -, **, *, /, and //. These facilities are built into Fortran and are called intrinsic procedures, intrinsic data types, and intrinsic operators.

A vector intrinsic function is one that has an array argument and is built into Fortran. For example, in

```
DIMENSION  TEMP(100),  X(100)
X  =  SIN(TEMP)
```

the function SIN with an array argument returns 100 values of the sine of TEMP, which in the example are assigned to a corresponding element of X.

A vector intrinsic function is one that has an array argument and is built into Fortran.

In version 6.0 of CF77, there will be a number of Fortran 90 array functions. The array construction functions are MERGE, PACK, SPREAD, and UNPACK. A RESHAPE function will allow the programmer to reshape a rank-1 array to any array of any specified shape, up to seven dimensions. The CSHIFT, EOSHIFT, and TRANSPOSE functions shift and transpose the elements of an array.

A vector function may return an array result, or it may return a scalar result "reduced" from an array (an array reduction function). The array reduction functions in Fortran 90 are ALL, ANY, COUNT, MAXVAL, MINVAL, PRODUCT, and SUM. These functions will also be in the next version of CF77, version 6.0. For example,

```
...
DIMENSION  Y(10)
X  =  SUM(Y)
...
```

sums the 10 elements of Y and assigns the value to the scalar X.

Fortran 90 and version 5.0 of CF77 have whole-array assignment and whole-array expressions as well as array-section assignment and array-section expressions (see the April issue of *SCD Computing News).* In order to use the mathematical and conversion intrinsic functions in these expressions and assignment statements using whole arrays, array-valued results from intrinsic functions are needed. Cray CF77 has full vectorization of most of these functions. Appendix B of the Cray Research publication *CF77 Compiling System, Vol. 1: Fortran Reference Manual (SR-3071 5.0)* contains tables that indicate which functions provide vector-valued results.

The simple case in Example 1 uses a DATA statement to establish values for X. Using a whole-array assignment statement, Y is set to 2.8 times X. The next assignment sums the vector values using SIN and COS intrinsics, and assigns the result to the vector Z.

Example 1. Vector intrinsic functions

Program

```
PROGRAM FULLVECT
 REAL X(10), Y(10), Z(10), R(10)
 DATA X /2., 3.1, 4.5, 1.0, 1.0, 1.0, 7.23, 42., 1.0, 1.0/
 Y = 2.8 * X
 Z = SIN (X) + COS (Y)
 R = ALOG (Y) + .5
 PRINT "(A,10F6.1/)","X", X,"Y", Y,"Z", Z,"R", R
END
```

Output

```
X    2.0    3.1    4.5    1.0    1.0    1.0    7.2    42.0    1.0    1.0

Y    5.6    8.7   12.6    2.8    2.8    2.8   20.2   117.6    2.8    2.8

Z    1.7   -0.7    0.0   -0.1   -0.1   -0.1    1.0    -1.1   -0.1   -0.1

R    2.2    2.7    3.0    1.5    1.5    1.5    3.5     5.3    1.5    1.5
```

R is a vector that is assigned values for the expression ALOG(Y) + .5. The intrinsic ALOG has full vectorization, and .5 is broadcast to the number of elements declared for vectors Y and R.

In Example 2 (page 18), the scalar A is set to 23, and its square root is calculated through traditional Fortran. MARIGOLDS is a vector of 10 values initialized in a DATA statement. BB is the vector of the square roots of the vector AA in a whole-array assignment statement using a vector square root. AA is assigned floating-point values in the assignment of MARIGOLDS, a type INTEGER rank-1 array.

TULIPS is assigned a value from the SIN of the FLOAT function of MARIGOLDS, plus the scalar 3.2,which is broadcast to ten elements—the number of elements in MARIGOLDS and TULIPS.

In the last assignment statement, an array section is used for both TEMPERATURE_NORTH and WEST. The section WEST (1:10, 2:3) is conformable with (has the same shape as) TEMPERATURE_NORTH (5:50:5,2:3). In the printout of the array WEST, the first row of the second dimension is not involved and happens to be zero. The second row of the second dimension is derived from TEMPERATURE_NORTH having been assigned values from BB. The third row is simply the TAN of the value 999. It was initialized as 999 before the assignment of BB to the second row of the second dimension.

The bit intrinsic functions of Fortran 90 are fully vectorized in Cray Fortran.

Other intrinsics

The bit intrinsic functions of Fortran 90 are fully vectorized in Cray Fortran. These were discussed in

Example 2. Vector assignment and intrinsic functions

Program

```
      PROGRAM INTRIN
        IMPLICIT NONE
        REAL TEMPERATURE_NORTH (50,4), WEST (10,3)
        REAL TULIPS (10), A, B, AA(10), BB(10)
        INTEGER MARIGOLDS (10)
        DATA MARIGOLDS /2, 4, 6, 8, 10, 0, 0, 0, 0, 0/
        DATA A /23./
C
        B = SQRT (A)
      PRINT "(A, 2F5.1)", "SCALAR A AND B", A, B
C
        AA = MARIGOLDS
        BB = SQRT (AA)
      PRINT "(A,10F5.1)", "VECTOR AA", AA, "VECTOR BB", BB
C
        TULIPS = 3.2 + SIN (FLOAT (MARIGOLDS) )
      PRINT "(A, 10F5.1)","TULIPS", TULIPS
C
        TEMPERATURE_NORTH = 999.
        TEMPERATURE_NORTH (5:50:5, 2) = BB
        WEST (1:10,2:3) = TAN ( TEMPERATURE_NORTH (5:50:5,2:3) )
      PRINT "( A,/(10F7.3/) )" , "WEST", WEST
      END
```

Output

```
SCALAR A AND B 23.0  4.8

VECTOR AA   2.0   4.0   6.0   8.0   10.0   0.0   0.0   0.0   0.0   0.0

VECTOR BB   1.4   2.0   2.4   2.8    3.2   0.0   0.0   0.0   0.0   0.0

TULIPS      4.1   2.4   2.9   4.2    2.7   3.2   3.2   3.2   3.2   3.2

WEST
 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000

 6.334 -2.185 -0.829 -0.324  0.021  0.000  0.000  0.000  0.000  0.000

-0.026 -0.026 -0.026 -0.026 -0.026 -0.026 -0.026 -0.026 -0.026 -0.026
```

the February issue of *SCD Computing News.* The following intrinsic names take INTEGER arguments: IOR, IAND, NOT, IEOR, IBSET, IBCLR, BTEST, ISHFT, ISHFTC, MVBITS, and IBITS.

For example, the logical AND, IAND(1,3) with arguments 1 and 3 would be:

Argument		Result of
1	3	IAND(1,3)
1	1	1
0	1	0
0	0	0
0	0	0

The exclusive OR, IEOR(1,3), has the value 2. The inclusive OR, IOR(1,3) has the value 3.

On the CRAY Y-MP8/864 (shavano), SHIFT, SHIFTL, and SHIFTR remain from earlier Fortrans and are offered as shifting functions that take REAL and INTEGER arguments. They also take Boolean constants and Cray pointers as arguments. (Note that REAL arguments may be used with AND, OR, NOT, and XOR as a Cray extension to the above Fortran 90 bit intrinsics, which are restricted to INTEGER type in the Fortran 90 standard.)

The date and time functions, as well as the system clock, are available; however, the names are different from the ones chosen for Fortran 90. There is a Fortran 90 DATE_AND_TIME intrinsic function with four optional arguments that provide for the Cray functions CLOCK, TIMEF, DATEF, and DATE. In Fortran 90 there is a system clock with three arguments that obtain data from the system clock. It is called SYSTEM_CLOCK, and some of its functionality is available with RTC (real-time clock) on the Cray.

The Fortran 90 random-number generation is available using the intrinsic subroutines RANDOM_NUMBER and RANDOM_SEED. The subroutine RANDOM_NUMBER returns one pseudo-random number (a scalar) or an array of these numbers (depending on whether the argument is scalar or an array) from the uniform distribution over the range of 0 to 1. For example, in the following code segment,

```
...
DIMENSION X(10)
CALL RANDOM_NUMBER(X)
...
```

the array X is returned with ten random numbers generated.

In CF77 6.0, there will be a number of Fortran 90 array functions.

The same facility is provided on the CRAY Y-MP, but the names are different: use RANF, RANGET, and RANSET on the Cray to generate random numbers.

MATMUL and DOT_PRODUCT are available as external functions. These functions, which are intrinsic in Fortran 90, will be available in a subsequent release of CF77 as intrinsics.

Jeanne Adams was chair of the American National Standards Institute (ANSI) committee that developed Fortran 90, and is a past chair of the International Programming Languages Committee of the International

The WHERE construct in Fortran 90 and CF77 6.0

by Jeanne Adams

Editor's note: This is the ninth in a series of articles about Fortran 90 features available on version 5.0 of CF77, the Cray compiling system. Future articles will discuss new input/output facilities and pointers in Fortran 90 and CF77.

In addition to the transformational functions (see "Fortran 90, CF77 5.0 make use of vector intrinsic functions," in this issue), the 6.0 version of CF77, tentatively scheduled for release in April 1993, will have the WHERE construct as well. The WHERE statement and the WHERE construct are referred to as masked-array assignment. In other words, these instructions perform an array assignment selectively using a mask—that is, only certain elements of one array are assigned to another array based on whether the mask is true or false. The mask is a logical array expression. The arrays in an assignment statement must be conformable. Every assignment in a WHERE construct is executed, whether in the WHERE block or in the ELSEWHERE block (if there is one). Assignments are made based on the evaluation of the mask expression. (Note that WHERE constructs may not be nested.) For example, a WHERE statement might be:

```
WHERE (M.EQ.0) Y = 0.0
```

Example 1. A simple program using the WHERE construct

Program

```
PROGRAM SELECT
 IMPLICIT NONE
 REAL TRADE(10), ELEMENTS(10), GROWING(10)
 DATA GROWING/1., 2., 3., 4., 5., 0, 0, 0, 6., 0/
 TRADE = 3.33
 WHERE (GROWING .NE. 0.)
   ELEMENTS = 2. + GROWING
 ELSEWHERE
   ELEMENTS = TRADE
 END WHERE
PRINT "(A,10F6.2/)", "TRADE ", TRADE, "GROWING ", GROWING
PRINT "(A,10F6.2/)", "ELEMENTS" , ELEMENTS
END
```

Output

```
TRADE      3.33  3.33  3.33  3.33  3.33  3.33  3.33  3.33  3.33  3.33

GROWING    1.00  2.00  3.00  4.00  5.00  0.00  0.00  0.00  6.00  0.00

ELEMENTS   3.00  4.00  5.00  6.00  7.00  3.33  3.33  3.33  8.00  3.33
```

Syntax

The Fortran 90 formal syntax for the WHERE statement and the WHERE construct is:

where-stmt is *WHERE (mask-expr) assignment-stmt*

where-construct is *WHERE (mask-expr)*
[assignment-stmt] ...
[ELSEWHERE
[assignment-stmt] ...]
END WHERE

and a simple WHERE construct might be:

```
WHERE  (M.LE.N)
  Y = Z
ELSE WHERE
  Y = 2 * Z
END WHERE
```

where M, N, Y, and Z are all arrays dimensioned with the same number of elements (i.e., are conformable). The expressions (M.EQ.0) and (M.LE.N) generate a logical mask used to selectively assign values to Y.

In CF77 5.0, you may preprocess the WHERE construct or the WHERE statement in a Fortran preprocessor using the **-zv** or **-zp** options on the **cf77** control line. The simple program in Example 1 uses a preprocessor for code generation before compilation. In this program, a comparison is made between GROWING and 0 in a logical (or mask) expression. For elements of GROWING that are not 0, the corresponding elements of ELEMENTS are set to (2.+ that element of GROWING). For all other elements (that is, those that are 0), the value in ELEMENTS is set to the corresponding element of TRADE, 3.33.

The Fortran generated for the WHERE construct in the preprocessor uses the IF-THEN-ELSE construct of Fortran 77 and a DO loop, which will generate element-by-element sequential assignment. The preprocessed code (which is then processed by the CF77 compiling system) is:

```
DO J1X = 1,10
  TRADE(J1X) = 3.33
  IF (GROWING(J1X) .NE. 0.) THEN
    ELEMENTS(J1X) = 2.+GROWING(J1X)
  ELSE
    ELEMENTS(J1X) = TRADE(J1X)
  ENDIF
END DO
```

In Fortran 90, no order is implied for these elemental operations in a WHERE statement or construct. Assignments may be done in any order or simultaneously. The ordering of elements within the array itself is retained, of course. The elements of the array do form a sequence; subscripts along the first dimension vary most rapidly.

Jeanne Adams is a member of SCD's Computational Support Group. She is being included in the Institute of Electronic Engineers' Annals of the History of Computing *among those persons who have made a significant contribution to the history and development of computer science.*

HINTS FROM THE SCD CONSULTANTS

FORTRAN-lint: Checking subroutine library calls

by Tom Parker

Author's note: The following article is a reprint from the June 1991 issue of SCD Computing News, *with one important update: a pathname change from* ***/usr/local/src/lib/flint*** *to* ***/usr/local/lib/flint.*** *If you are referring to the old pathname (for example, in your* ***flint*** *configuration file* ***flint.cfg****), you should change to the new pathname. The old pathname will become invalid in October 1992.*

In the March 1991 *SCD Computing News,* we introduced FORTRAN-lint, a powerful Fortran-analysis tool that SCD purchased from Information Processing Techniques. FORTRAN-lint, which is invoked via the **flint** command on the CRAY Y-MP8/864 (shavano), analyzes Fortran programs and reports on potential problems both within and across routines. Consultants and users have used FORTRAN-lint to locate Fortran errors in large codes, at a savings in debug time to users.

Now an important new **flint** capability is available. You can use **flint** to check your calls to subroutines in any of the approximately 25 software libraries on shavano, including IMSL, NAG, SLATEC, NCAR Graphics, and many others.

How it works

To make this possible, SCD built a **.lbt** library file for each software library on shavano. When you specify a **.lbt** file (along with the **-g** option), **flint** will check your arguments to any routines in that library.

A **.lbt** filename is in the form **/usr/local/lib/flint/*xxx*.lbt**, where ***xxx*** generally corresponds to the software library name. Exact **.lbt** filenames are in file **/usr/local/lib/flint/lbtlist** on shavano.

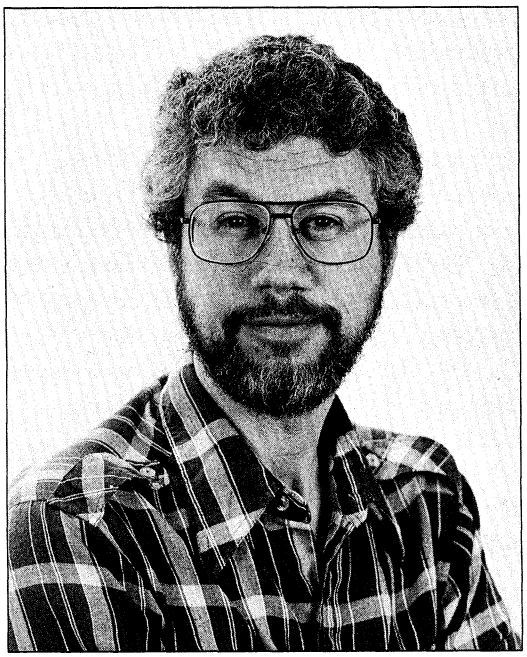
Note: We recommend the **-fgs** options for most **flint** runs. The **-g** option checks arguments; **-f** requests "FYI's" about your code (helpful in cleaning up code and avoiding potential problems); and **-s** requests a summary of the analysis.

The following are several methods you can use to check your library subroutine calls.

Method 1: Actual filenames

Using the first method, you specify which shavano libraries you want **flint** to check (just as you would on a **segldr** statement). For example, if you want **flint** to check calls to NCAR Graphics and NAG, you would specify:

```
set lbtdir = /usr/local/lib/flint
flint -fgs myfile.f $lbtdir/ncarg.lbt \
  $lbtdir/nag.lbt
```



SCD consultant Tom Parker

Method 2: Wildcard

The wildcard method gives you a convenient way to specify *all* the **.lbt** libraries by using a wildcard character. For example:

```
flint -fgs myfile.f \
  /usr/local/lib/flint/*.lbt
```

Note, however, that since the approximately 25 software libraries contain some duplicate entries, there is the potential that **flint** may check a different routine than the one intended—though this is rarely a problem.

Method 3: -E option

This method is the same as the wildcard method, except that you specify all the **.lbt** libraries by using the **-E** option. The **-E** option tells **flint** to include all the files specified in **/usr/local/lib/flint/lbtlist**. For example:

```
flint -fgs myfile.f \
  -E /usr/local/lib/flint/lbtlist
```

Method 4: Configuration file

The configuration file method is probably the easiest. It is just like the **-E** option method, except that you specify options in your **flint** configuration file rather than on the command line. (The configuration file allows you to specify frequently used options so you don't have to put them on your **flint** command line each time.)

Here are the one-time steps to follow:

1. In your home directory on shavano, create a file named **flint.cfg** that contains these two lines:

   ```
   -fgs
   -E /usr/local/lib/flint/lbtlist
   ```

2. In your **.login** file, type:

   ```
   setenv IPT_CONFIG $HOME
   ```

Then whenever you use **flint**, it will automatically check any calls to routines in all the software libraries. For example:

```
flint myfile.f
```

You can use 'flint' to check your calls to NCAR Graphics.

Method 5: Customized

With the customized method, you create your own list of **.lbt** files. If you don't normally use some of the libraries listed in **/usr/local/lib/flint/lbtlist**, you can edit that file to remove the libraries you don't want, then save the new file in your home directory—for instance, in **my/lbtlist**. You can then then point to this file using any of the previous methods. For example, using the **-E** option method, you would type:

```
flint -fgs mylib.f -E $HOME/my/lbtlist
```

The advantage of the customized method is that it may be more efficient, because **flint** doesn't have to search extra libraries. On the other hand, if you use different libraries in different programs, the customized method may not be worth the effort.

In conclusion

We know you will find this **flint** subroutine checking capability useful. We recommend you use it so **flint** can check your library calls. We will continue to create new **.lbt** files whenever

Use 'flint': Save your code, save your job

by Sally Haerer and Lynda Lester

The Fortran compiler CFT77 5.0 analyzes your code to identify errors, but checks only one module at a time; it never looks at the interaction between modules. This means that if you have a large code, such as a main program with numerous subroutines, you could put it through the Fortran compiler on the CRAY Y-MP8/864 (shavano) and get no errors; you would be able to load and execute the code because it compiled, but you might still get run-time errors or wrong answers.

The Fortran compiler will not find an error in your code if:

- A subroutine call has a different number of arguments from the subroutine statement
- An integer variable is being passed into a real variable, or vice versa (a common cause of wrong answers)
- A variable being passed to a subroutine is treated as an array by the subroutine
- A constant being passed to a subroutine is changed by the subroutine

In some cases, users have been running their code for a long time, getting realistic answers; upon using **flint**, they identified problems between subroutines that might have been damaging the results of the code. If **flint** indicates numerous problems in subroutine interaction, whether or not you've been getting accurate answers, you are potentially running with fragile code such that any small improvement in system software could cause your code to break or generate wrong answers.

This is why SCD consultants recommend that you run all your codes, whether in development or production, through **flint**. While **flint** cannot be used in place of the Fortran compiler, it is a valuable tool for improving and stabilizing your code.

Sally Haerer is head of the Consulting Group; Lynda Lester is a writer/editor in the Documentation Group within the SCD User Services Section.

new software libraries are obtained or modified. **Note:** SCD built the **.lbt** files using the **-L** option of **flint**. Users with their own software libraries can also use this technique to build **.lbt** files, and invoke them using the methods described in this article.

For more information on **flint**, see the **flint man** page; see also the article "Powerful new Fortran source code analyzer available" in the March 1991 *SCD Computing News.* A detailed source of information is the *IPT User's Manual, FORTRAN-lint Source Code Analyzer.* You can order this manual from SCD using the information on the back cover of this newsletter.

Tom Parker is a consultant in the SCD User Services Section.

SYSTEMS NEWS

No more GAU charge for connect time on shavano

As of August 1, there is no longer a charge for connect time—that is, the time accrued during an interactive session on the CRAY Y-MP8/864 (shavano). The General Accounting Units (GAU) formula is:

G = J + C + .000167*DA + t*(.002A + .0019*A**2) + .0002*ID + .0002*IT

where

G = GAUs

J = Job charge, .001 GAUs per job (not assessed for interactive jobs)

C = CPU hours used

DA = Cray disk drive I/O activity, in megawords

t = Memory residency time, in hours (excluding time waiting to execute)

A = Average memory used, in megawords

ID = Mass Storage System (MSS) disk I/O activity, in megawords

IT = MSS tape cartridge I/O activity, in megawords

To account for the charging factor of the job queue used, the total charge for shavano jobs is calculated by applying the charging factor listed in Table 1 of the "Charges for SCD Computing Resources" UserDoc. (For document ordering information, see the back cover of this newsletter.)

NETWORKING AND DATA COMMUNICATIONS NEWS

Ownership set properly for NFS cross-mounted files

In mid-July, the Mainframe and Server Network (MASnet) software was fixed to properly set the owner of files disposed from MASnet when the destination directory is Network File System (NFS) cross mounted. Formerly, these files would have been owned by user "ntwk."

GRAPHICS NEWS

Latest translator installed, line-width problem fixed on TAGS

Version 3.1.3 of the NCAR Graphics translator **ctrans** has been installed on the Text and Graphics System (TAGS). In addition, the line-width simulation has been fixed for film output. This means metafiles with line widths greater than 1 will now be imaged correctly for the **QUAL=GOOD** and **QUAL=BETTER** parameters. Previously, any line-width information was ignored.

The following new TAGS parameters are available (**REQ=NCGM** or **REQ=CGM** only):

LMIN=*n* Sets minimum line width to ***n***

LMAX=*n* Limits maximum line width to ***n***

LSCA=*n* Scales all line widths by ***n***

If you have any questions about these changes to TAGS, please contact the consultant on duty by sending e-mail to consult1@ncar.ucar.edu or by calling (303) 497-1278.

IRJE processing of .tagsparms keywords has changed

The Internet Remote Job Entry system (IRJE) no longer checks the value of the **MACR** or **REQ** **.tagsparms** keywords for validity. Any keywords that IRJE does not recognize will be passed through to the Text and Graphics System (TAGS) exactly as specified. TAGS will perform checking of the validity and values of these new keywords.

This change has been made because there have been too many recent changes to the TAGS system's keyword set for the IRJE system to keep up. For now, all **.tagsparms** keywords continue to work as documented in the IRJE UserDoc ("IRJE: Using the NCAR Internet Remote Job Entry System"); but they do *not* all work as documented in the TAGS document (see the TAGS UserDoc for your access method—UNICOS, UNIX, or MIGS). (The back cover of this newsletter contains document ordering information.) There are some differences between what goes in IRJE **.tagsparms** files and, for instance, what the **sendtg** command accepts.

Eventually, all keyword processing for TAGS jobs by the IRJE system will be phased out, and all **.tagsparms** keywords will be passed through unmodified and unchecked by the IRJE system. At that time, **.tagsparms** files will have to be changed to match the actual TAGS keywords.

If you have questions about IRJE processing of **.tagsparms** keywords, contact the SCD consultant on duty (e-mail: consult1@ncar.ucar.edu; phone: 303-497-1278).

TRAINING NEWS

Learn the UNIX basics

The SCD UNIX Basics Class will be held from 09:00–15:00 Mountain Time in the Director's Conference Room at the NCAR Mesa Lab on the following dates:

October 7–8	(Wednesday–Thursday)
December 2–3	(Wednesday–Thursday)

This free, two-day class introduces you to the basics of UNIX. Topics covered include essential UNIX commands; UNIX file permissions; I/O redirection, pipes, and filters; job processing; the **vi** editor; UNIX e-mail; and basic C shell features such as history, aliasing, simple scripts, and shell files.

UNIX Basics is a popular hands-on class and often has a waiting list. To increase your chances of getting into the class you want, register early.

To register, send e-mail to scdinfo@ncar.ucar.edu or call the SCD course-enrollment line at (303) 497-1225. (**Note:** This class or equivalent knowledge of UNIX is a prerequisite for the UNICOS Orientation Class.)

Make the most of UNICOS

The UNICOS Orientation Class will be held from 08:30–16:30 Mountain Time in the Damon Room at the NCAR Mesa Lab on Tuesday, December 8.

The class introduces UNIX/UNICOS programming tools and the NCAR computing environment, and requires a good understanding of basic UNIX.

Topics covered include **make** and makefiles, shell scripts, NCAR hardware and access methods, Mass Storage System commands, CFT77 and CF77, library and **segldr** considerations, **fmgen**, the NQS (Network Queueing System) batch system, job accounting, graphics facilities, and debugging with **cdbx**.

Please register in advance by sending e-mail to scdinfo@ncar.ucar.edu or calling the SCD course-enrollment line at (303) 497-1225.

UNICOS class called 'riveting'

The following are some comments made by students attending a recent UNICOS Orientation Class.

"I was surprised at how riveting the course was. The material was presented very clearly and highlighted points that I had not understood well before."

"Covered a lot of material in a short period of time with clear, concise explanations and examples. Learned more in this class than in a full semester workshop at [a university]."

"Enjoyed very much; very informative. Instructor was extremely knowledgeable and communicated easily."

DOCUMENTATION

This department lists recently released SCD documents, which you can order by phone or electronic mail. Instructions for obtaining printed copies of SCD documents appear under "SCD Documentation Orders" on the back cover of this newsletter. Instructions for obtaining copies of online documents appear at the end of this department.

Vendor documentation for the XC editor

"The XC Editor: An XEDIT Simulator Program," Version 1.1, August 1992 (139 pages) is now available. This is a complete reprint of the recently revised version of the **XC** documentation from the product creator, Syllabi, Inc. **XC** is an **XEDIT**-style editor written for the UNIX environment, and is available on the SCD UNIX front-end computer (meeker). The document covers all the **XC** commands in alphabetical order.

Efficiency hints for shavano

"Hints for Using shavano Efficiently and Reducing Your Charges," Version 1.0, August 1992 (19 pages) contains information on how you can decrease the turnaround time for your CRAY Y-MP8/864 (shavano) jobs and reduce General Accounting Unit (GAU) charges. This collection of recent articles from *SCD Computing News* shows how to build checkpointing capabilities into your jobs, set Network Queueing System (NQS) limits, optimize your I/O, and drop unneeded jobs before they run.

Latest charging information

The updated "Charges for SCD Computing Resources," Version 7.2, August 1992 (22 pages) provides the formulas to compute General Accounting Unit (GAU) charges for using the computing resources in SCD. It contains descriptions of new CRAY Y-MP8/864 (shavano) job queues, updates on the maximum memory allowed in the various job queues, and instructions for obtaining current online information on subqueues within each queue. It contains the charging formulas for use of shavano, the Mass Storage System, the Text and Graphics System, the Xerox 4050 laser printer, and the 1-800 connect account. This document is also available online via anonymous FTP to ftp.ucar.edu in the **docs/other** directory under the filename **charges.gau.**

How to access the SCD Daily Bulletin

The Daily Bulletin is an online daily status report of all SCD computing systems. It is the most current source of news about computing at NCAR, giving information about hardware, software, documentation, communication links, and scheduled and unscheduled computer downtime.

The Daily Bulletin is prepared weekdays by the SCD Consulting Office between 08:45 and 09:00 Mountain Time and again, if necessary, at 16:00.

Interactive access

If you log on to the CRAY Y-MP8/864 (shavano), the front-end computer (meeker), or one of the NCAR divisional computers, type:

dailyb

IRJE access

If you use the Internet Remote Job Entry System (IRJE), use File Transfer Protocol (FTP) to access the computer named windom.ucar.edu. Once you have logged on to your account, type:

get .dailyb ***filename***

where ***filename*** is the name you assign to the file on your computer.

MIGS access

If you use the MASnet/Internet Gateway Server (MIGS) from your local computer, type:

nrnet dailyb ***filename***

where ***filename*** is the name of the local file into which the Daily Bulletin will be returned.

FTP access

The Daily Bulletin is now also available via anonymous FTP in the top-level directory with the filename **dailyb**. For directions on how to obtain SCD documentation via anonymous FTP, see "Obtain SCD documentation via anonymous FTP," below.

If you have questions, please contact the SCD consultant on duty by sending e-mail to consult1@ncar.ucar.edu or calling (303) 497-1278.

Watch the Daily Bulletin to keep up with timely developments in the Scientific Computing Division.

Obtain SCD documentation via anonymous FTP

A growing number of SCD documents are available via anonymous File Transfer Protocol (FTP) on the computer named ftp.ucar.edu. The *User Documentation Catalog*, which includes descriptions of UNICOS documentation, and the yearly indexes of *SCD Computing News* are also available online. The complete list of online documents is in the **README** file in the **docs** subdirectory.

To obtain copies of online documents, follow the steps below.

1. From your local computer connected to the Internet, type:

   ftp ftp.ucar.edu

   or

   ftp 128.117.64.4

2. When prompted for a logon name, type:

   anonymous

   Note: If your local computer is a Digital Equipment VAX running VMS, you may need to type:

   "anonymous"

3. Enter your logon ID at the password prompt and wait for the ftp> prompt.

   If you're examining **docs** for the first time, you may obtain a **README** file with a list of the documentation categories (subdirectories) currently available by typing:

   cd docs
   get README
   quit

   You can read the **README** file using your own system tools.

   If you already know the subdirectory you want, you can use the **dir** (or **ls**) command within directories to list the contents.

4. To transfer a file to your present working directory on your local computer, change directories to the desired subdirectory of **docs** and use the **get** command. For example:

   cd cray
   get *filename*

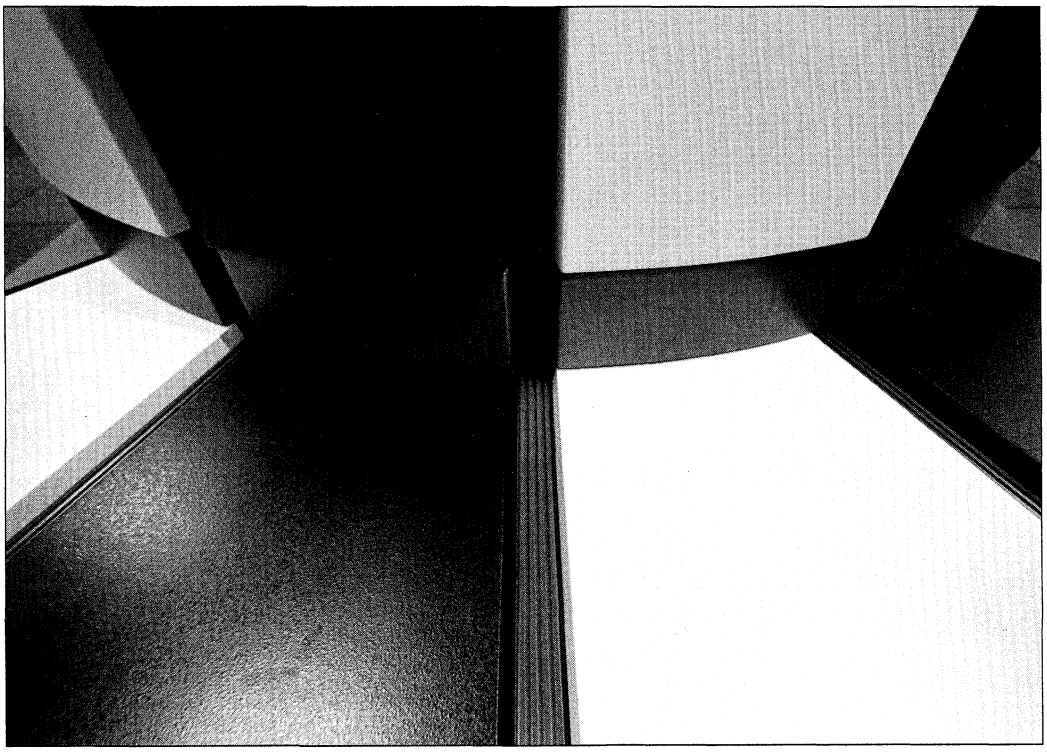
   where ***filename*** is the name of the file you want to transfer.

   Caution: If your local computer already has a file with a name identical to the one you want to transfer, your existing file will be replaced with the new file. To give a file a new name on your local computer, type:

   get *filename newfilename*

5. To terminate the anonymous FTP session, type:

   quit



A close look at the base of the Y-MP2D's I/O Subsystem reveals a striking geometric pattern. (Photo by Bob Bumpas.)

Conventions used in this newsletter

Bold represents command names, options, filenames, pathnames, directories, and other items that must be typed as shown.

Bold italics represent variables where you provide the substitution (such as ***filename***). In text, *italics* are used to highlight terminology being defined.

`Courier` is used for Fortran programs, shell scripts, and screen displays.

The \ (backslash) followed by pressing RETURN when you are entering a command allows you to continue the command on the next line. In UNIX, a \ escapes (ignores) the next character.

Panoramic view of the SCD Computer Room. At center are the Cray master consoles, and on the left is a small High-Performance Parallel Interface (HIPPI) PS32 switch box. Behind the switch box, a Liebert air conditioner (white) and cabinets (black); in the far background, left and center, the Mass Storage System. The stacked boxes next to the post, right rear, are Network Systems Corporation adaptors; other cabinets house various Cray equipment. On the right stands the CRAY Y-MP2D (castle). (Photo by Bob Bumpas.)

SCD computer schedule

The SCD computers run continuously, except for scheduled maintenance times and unforeseen equipment or power failures. The computers may be unavailable during the following times:

Computers	Days	Times (Mountain Time)
All computers	Daily as needed	06:00–08:30
CRAY Y-MP8 (shavano)	Every other Monday	05:00–08:00
CRAY Y-MP/2D (castle)	3rd Wednesday of month	05:00–08:00

The latest version of the operations schedule is available via anonymous FTP on ftp.ucar.edu under the pathname **/docs/other/op.schedule**. Read the online version of the Daily Bulletin for daily information on the status of all SCD equipment.

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☐ Add to mailing list ☐ Delete from mailing list ☐ Change existing entry

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Send to: User Information, Scientific Computing Division, NCAR, P.O. Box 3000, Boulder, CO 80307-3000. Or include the above information in e-mail addressed to sylvia@ncar.ucar.edu on the Internet.

SCD SERVICES DIRECTORY

	Contact	Phone (303)	E-mail
General Information			
SCD Consulting Office	Consultant on Duty	497-1278	consult1
SCD Visitor/User Information		497-1225	scdinfo
SCD Course Enrollment		497-1225	scdinfo
Graphics Software Purchase Information		497-1201	scdinfo
Data Communications/Networking	Marla Meehl	497-1301	marla
Research Data Archive Access	Data Support	497-1219	datahelp
Project & User Number Assignment	Rosemary Mitchell	497-1235	rosemary
Computing Resource Applications	JoAn Knudson	497-1207	knudson
SCD Computing News Editor	Lynda Lester	497-1285	lester
NCAR Switchboard		497-1000	
Networking Information			
Data Communications/Networking Information	Consultant on Duty	497-1278	consult1
Network Trouble Reports (24 hour)	Operations Supervisor	497-1200	opns
NCAR/UCAR Network Work Requests	Belinda Housewright	497-1310	scdmg
Operations Information			
Computer Operations	Bob Niffenegger	497-1240	niff
Machine Room	Operations Supervisor	497-1200	opns
Graphics Operations	Andy Robertson	497-1241/42	andy
Tape Librarian	Sue Jensen	497-1245	sue
Output Mailing	Mary Buck	497-1232	docorder
Documentation			
SCD Documentation Information		497-1225	scdinfo
SCD Documentation Orders	Mary Buck	497-1232	docorder

Sending Electronic Mail to NCAR Staff: Use the addresses in the e-mail column above and the appropriate network information below to send e-mail to SCD staff:

- Internet address: *name*@ncar.ucar.edu (IP node 128.117.64.4)
- BITNET users: Use the BITNET address *name*@ncario. Please consult your system administrator for the exact syntax.
- SPAN address: NSFGW::"*name*@ncar.ucar.edu" (DECNET node 9580 or 9.364)
- Telemail/OMNET address: *name*@ncar.ucar.edu (for the Internet address)

For further information on e-mail, please see the UserDoc "Using the NCAR E-mail System."

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